WEST Search History

DATE: Saturday, April 26, 2003

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ			
L21	battery and L20	34	L21
L20	(torque same request$3) and L19	39	L20
L19	torque and L17	191	L19
L18	torqueL17	0	L18
L17	((701/22)!.CCLS.)	253	L17
L16	(hybrid near3 control$4) near4 (divid$3 or organiz$3 partition$4) near5 (module or portion$1 or part$1 or section$1)	2	L16
L15	(hybrid controller) same (divid$3 or group$3 or organiz$3 or section or part$6 or portion)	24	L15
L14	hybrid controller	99	L14
L13	hydric controller	0	L13
L12	l3 and L11	59	L12
L11	(controller or control system) same (divid$3 or group$3 or organiz$3 or section or part$6 or portion) same (function$7) same (vehicle or car or automobile)	4066	L11
DB=TDBD; PLUR=YES; OP=ADJ			
L10	(controller or control system) same (divid$3 or group$3 or organiz$3 or section or part$6 or portion) same (function$7) same (vehicle or car or automobile)	24	L10
L9	(controller or control system) near5 (divid$3 or group$3 or organiz$3 or section or part$6 or portion) same (function$7) same (vehicle or car or automibile)	1	L9
DB=USPT; PLUR=YES; OP=ADJ			
L8	l3 and L7	140	L8
L7	(controller or control system) near5 (vehicle or automobile) same (module or modular)	976	L7
L6	l4 and L5	88	L6
L5	(controller or processor or computer or micro$1processor) same (plurality) same (module$1)	11603	L5
L4	(controller or processor or computer or micro$1processor) and l3	872	L4
DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ			
L3	(MODULE OR MUDULAR) AND L2	2876	L3
L2	(HYBRID OR ELECTRIC) NEAR2 (VEHICLE OR CAR OR AUTOMOBILE OR AUTOMOTIVE)	54724	L2
	(hybrid or elcetric) near2 (vehicle or car or automobile or		

L1	(hybrid or electric) near2 (vehicle or car or automobile or automotive)	8503	L1

END OF SEARCH HISTORY

L5: Entry 64 of 73 File: USPT Sep 6, 1994

DOCUMENT-IDENTIFIER: US 5343974 A
TITLE: An electrically powered motor vehicle

Abstract Text (1):
A motor vehicle including modular units for operating two rear wheels of the vehicle the motive unit includes a rigid link which is pivotally connected between the rear wheel and the motive unit, and the motive unit is operable by a motor. A rigid link is pivotally connected, and the rear wheels are spring suspended mounted relative to the frame of the vehicle. In an electrical vehicle form, there is a slidable movable battery pack located in a rear compartment of the vehicle for easy installation and removal from the vehicle. Different traction characteristics can be provided to the motive unit including an integrated motor, integrated gear box, and power input-output shaft accessible to secondary power or an energy recycler unit. Steering is effected by a controller which operates the speed of the driven wheels.

Brief Summary Text (15):
Another aspect of the invention is the removal of heavy and bulky parts from the body frame of the vehicle. This relieves structural stresses and allows lighter construction to provide more space for safety and comfort for the driver and passengers.

Brief Summary Text (19):
In the advanced version of such vehicle, there is an electric motor with an associated gear reducer added to the Basic Traction Module. This creates a complete self-contained Power Traction Module, in some respects similar to the outboard motor in a boat. Such power traction modules considerably simplify design and construction, by removing all parts of the power train from the vehicle body.

Brief Summary Text (21):
Another characteristic of this invention is alleviation of dependence of the electric vehicle on the capacity of its batteries. The accessibility of a removable battery pack located low between the two power traction modules allows easy replacement of the depleted battery pack with a charged pack at a gas-battery station. The vehicle contains means for facilitating replacement of a battery pack, the battery pack being slidably mounted on support means in the vehicle. Removal of the battery is effected by rolling the battery from the vehicle to an adjacent support carriage. Replacing a recharged battery is effected by rolling the new battery from an adjacent carriage into the vehicle. This process of replenishing energy will be cheaper and will take no more time than filling a gasoline tank for the equivalent milage. Once a network of battery supply stations is established, or when the gas stations add this function to their operation, this feature, with respect to the operating range, will place the electric vehicle on equal footing with a conventional I.C. automobile.

Drawing Description Text (16):
FIG. 15 is a side view of an electric vehicle illustrating a optional movable battery pack location in the rear of the vehicle of FIG. 1.

Drawing Description Text (17):
FIG. 16 is a top view of an electric vehicle illustrated in FIG. 15 with a battery pack located adjacent the vehicle.

Detailed Description Text (4):

The vehicle 1 includes a frame or chassis 109 on which the body 110 is located. The vehicle 1 includes respectively right and left Power Traction Modules 2 and 3, each attached in at least two places with bolts 4 and screws 5 to frame members 6 and 7 being part of the overall frame 109. A non-traction, steerable front wheel assembly 8 is also attached to the frame of the vehicle 1. Space 9 in the rear of the vehicle 1 is reserved for batteries or a battery pack, a controller and other components of the electrical system which are complementary to the Power Traction Modules 2 and 3. Space is provided for three persons 108 sitting in line across the vehicle slightly in front of the center of gravity and therefore having little effect on the overall weight distribution. Power from motors in the Power Traction Modules 2 and 3 applied to the wheels 10 causes a traction force to be imparted to a road surface 120 on which the vehicle 1 moves.

Detailed Description Text (12):
A Compound Traction Module is illustrated in FIG. 11. It includes a Power Traction Module with a modified gearbox with shaft 24 concentric with the module pivot. The shaft 24 provides for the input or output of power in an optional energy storage and recycling system for the module, or for the addition of extra power from an auxiliary power source in hybrid vehicles. Optional access for the mechanical or electric controls for a multi-speed or a freewheel drive module is also provided. As the motor 23 is also contained within the structure between pivot bearings 13, recycling of power is effected in a situation where a vehicle, when braking or traversing a downhill grade, can electrically regenerate power into the motive means for possible storage in the battery pack for the vehicle. Shaft 24 also allows installation of alternative means for energy storage or addition of power from a secondary source.

Detailed Description Text (24):
As illustrated in FIG. 15, there is a characteristic whereby a battery pack 111 is located in the rear of the vehicle 1 between the Power Traction Modules 2 and 3. It extends up to about midway in the vehicle length or slightly forward of the position of the wheels 10. The passengers 108 are located ahead of the battery pack 111.

Detailed Description Text (25):
The pack is slidably mounted on roller means 112 which fits in the rear on the base 113 of the vehicle. A tailgate 114 closes the rear portion of the vehicle through which the battery pack 111 can be removed on the slidable rollers 112. The rollers 112 can be powered or free-rolling as required.

Detailed Description Text (26):
The pack 111 can be slid onto a cart 115 which is brought into adjacency with the rear of the vehicle. A battery pack 116 which is shown on rollers 117 on the base 118 of the cart. The cart itself has wheels 119 by which it is brought into adjacency or removed from the vehicle 1 as required. In this manner, a battery pack can be removed from the vehicle and be replaced with a recharged battery pack 116 as required.

Detailed Description Text (29):
Other variations of the invention, the traction wheels can be provided in the front of the vehicle 1. Similarly, the battery pack 111 can also be located in different locations, including the front of the vehicle. In other words, the geometry and arrangement of the traction wheel, battery pack and steering can be rearranged relative to the load carrying compartments as required.

CLAIMS:

6. A vehicle as claimed in claim 1 including power storage means, the power storage means being a battery pack, the battery pack being horizontally removable relative to the frame, the horizontal removability being selectively longitudinal relative to the vehicle including means for facilitating rolling of the battery pack relative to a housing of the battery pack.

7. A vehicle as claimed in claim 6 wherein the battery pack is located between a pair of rear wheels, the battery pack being slidable rearwardly between a housing between the rear wheels and a position removed from the housing.

L5: Entry 64 of 73 File: USPT Sep 6, 1994

DOCUMENT-IDENTIFIER: US 5343974 A
TITLE: An electrically powered motor vehicle

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In the advanced version of such vehicle, there is an electric motor with an associated gear reducer added to the Basic Traction Module. This creates a complete self-contained Power Traction Module, in some respects similar to the outboard motor in a boat. Such power traction modules considerably simplify design and construction, by removing all parts of the power train from the vehicle body.

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Another characteristic of this invention is alleviation of dependence of the electric vehicle on the capacity of its batteries. The accessibility of a removable battery pack located low between the two power traction modules allows easy replacement of the depleted battery pack with a charged pack at a gas-battery station. The vehicle contains means for facilitating replacement of a battery pack, the battery pack being slidably mounted on support means in the vehicle. Removal of the battery is effected by rolling the battery from the vehicle to an adjacent support carriage. Replacing a recharged battery is effected by rolling the new battery from an adjacent carriage into the vehicle. This process of replenishing energy will be cheaper and will take no more time than filling a gasoline tank for the equivalent milage. Once a network of battery supply stations is established, or when the gas stations add this function to their operation, this feature, with respect to the operating range, will place the electric vehicle on equal footing with a conventional I.C. automobile.

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Detailed Description Text (24):
As illustrated in FIG. 15, there is a characteristic whereby a battery pack 111 is located in the rear of the vehicle 1 between the Power Traction Modules 2 and 3. It extends up to about midway in the vehicle length or slightly forward of the position of the wheels 10. The passengers 108 are located ahead of the battery pack 111.

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Detailed Description Text (26):
The pack 111 can be slid onto a cart 115 which is brought into adjacency with the rear of the vehicle. A battery pack 116 which is shown on rollers 117 on the base 118 of the cart. The cart itself has wheels 119 by which it is brought into adjacency or removed from the vehicle 1 as required. In this manner, a battery pack can be removed from the vehicle and be replaced with a recharged battery pack 116 as required.

Detailed Description Text (29):
Other variations of the invention, the traction wheels can be provided in the front of the vehicle 1. Similarly, the battery pack 111 can also be located in different locations, including the front of the vehicle. In other words, the geometry and arrangement of the traction wheel, battery pack and steering can be rearranged relative to the load carrying compartments as required.

CLAIMS:

6. A vehicle as claimed in claim 1 including power storage means, the power storage means being a battery pack, the battery pack being horizontally removable relative to the frame, the horizontal removability being selectively longitudinal relative to the vehicle including means for facilitating rolling of the battery pack relative to a housing of the battery pack.

7. A vehicle as claimed in claim 6 wherein the battery pack is located between a pair of rear wheels, the battery pack being slidable rearwardly between a housing between the rear wheels and a position removed from the housing.

L5: Entry 23 of 73 File: PGPB Jun 27, 2002

DOCUMENT-IDENTIFIER: US 20020079148 A1
TITLE: Hybrid vehicle and control method thereof

Abstract Paragraph (1):
A hybrid vehicle including an engine, a generator motor, an output shaft connected to a drive wheel, a differential gear device, a fixing device for mechanically fixing a rotation of the generator motor, a correction value calculation processing device for calculating a correction value based on an estimated engine torque calculated through estimation and a generator motor torque, and an engine torque correction processing device for correcting the estimated engine torque by the correction value. The correction value is calculated based on the estimated engine torque calculated through estimation and the generator motor torque, and the estimated engine torque is corrected by the correction value. Therefore, it is possible to prevent an event where after the fixation of rotation by the fixing device is removed, the rotor of the generator motor is affected by the service condition of the engine.

Summary of Invention Paragraph (3):
[0002] The invention relates to a hybrid vehicle and a control method thereof.

Summary of Invention Paragraph (5):
[0004] A conventional hybrid vehicle in which a torque of the engine, that is, a portion of the torque is distributed to a generator motor and the remainder torque is distributed to a drive wheel, has a planetary gear unit that includes a sun gear, a ring gear and a carrier. The carrier is connected to the engine, the ring gear is connected to the drive wheel and the sun gear is connected to the generator motor. Rotation outputted from the ring gear and a drive motor is transferred to the drive wheel to produce a drive force.

Summary of Invention Paragraph (6):
[0005] In the hybrid vehicle constructed as described above, electric power is generated by the generator motor when the vehicle is run by driving the drive motor and the engine. If the rotation speed of the generator motor, that is, the generator motor rotation speed, is low, the electric power consumption becomes great and the electric power generation efficiency correspondingly reduces. Therefore, a design is made as follows. That is, a brake as a fixing device is disposed between a rotor of the generator motor and a casing. If the generator motor rotation speed becomes equal to or less than 500 rpm, the brake is engaged to fix the rotation of the generator motor. After that, the generator motor rotation speed is calculated based on a rotation speed of an output shaft, that is, an output rotation speed, of the planetary gear unit calculated based on the vehicle speed, and a revolution speed of the engine, that is, an engine revolution speed, at an engine operation point where the power generation efficiency is high. If the generator motor rotation speed becomes greater than 500 rpm, the brake is released to remove the fixation of rotation to allow the rotor to rotate.

Summary of Invention Paragraph (8):
[0007] Therefore, the engine torque transferred to the rotor is estimated, and the brake is released after a generator motor torque corresponding to the estimated engine torque is produced in a direction opposite to the direction of the engine torque, to reduce the aforementioned occurrence of a shock. (Japanese Patent Application Laid-Open No. HEI 9-100853).

Summary of Invention Paragraph (9):
[0008] However, in the above-described conventional hybrid vehicle, a difference occurs between the estimated engine torque and the actual engine torque depending on the service condition of the engine, for example, the temperature of engine oil and the like, and furthermore, depending on individual variations of engines, for example, the inertia of the engine. Therefore, occurrence of a shock cannot be sufficiently suppressed.

Summary of Invention Paragraph (11):
[0009] In view of the foregoing, the invention thus provides a hybrid vehicle and a control method thereof capable of sufficiently suppressing the occurrence of a shock when the fixation of rotation by the fixing means is removed.

Summary of Invention Paragraph (12):
[0010] In various exemplary embodiments of a hybrid vehicle according to the invention, the hybrid vehicle includes: an engine; a generator motor; an output shaft connected to a drive wheel; a differential gear device including at least three gear elements that are connected to the engine, the generator motor and the output shaft, respectively; a fixing device for mechanically fixing rotation of the generator motor; a correction value calculation processing device for calculating a correction value based on an estimated engine torque calculated through estimation and a generator motor torque; and an engine torque correction processing device for correcting the estimated engine torque by the correction value.

Summary of Invention Paragraph (13):
[0011] In this case, the correction value is calculated based on the estimated engine torque calculated through estimation and the generator motor torque, and the estimated engine torque is corrected by the correction value. Therefore, it becomes possible to prevent an event where after the fixation of rotation by the fixing means is removed, the rotor of the generator motor receives an influence caused by the service condition of the engine, for example, the temperature of engine oil or the like, or an influence caused by individual variations of the engine, for example, the inertia of the engine.

Brief Description of Drawings Paragraph (3):
[0014] FIG. 1 is a function block diagram of a hybrid vehicle in accordance with a first embodiment of the invention;

Brief Description of Drawings Paragraph (4):
[0015] FIG. 2 is a conceptual diagram of a hybrid vehicle in accordance with the first embodiment of the invention;

Brief Description of Drawings Paragraph (7):
[0018] FIG. 5 is a block diagram illustrating a control unit of the hybrid vehicle in accordance with the first embodiment of the invention;

Brief Description of Drawings Paragraph (8):
[0019] FIG. 6 is a main flowchart illustrating an operation of the hybrid vehicle in accordance with the first embodiment of the invention;

Brief Description of Drawings Paragraph (11):
[0022] FIG. 9 is a time chart illustrating an operation of the hybrid vehicle in accordance with the first embodiment of the invention;

Brief Description of Drawings Paragraph (12):
[0023] FIG. 10 is a main flowchart illustrating an operation of a hybrid vehicle in accordance with the second embodiment of the invention; and

Detail Description Paragraph (3):
[0026] FIG. 1 is a function block diagram of a hybrid vehicle in accordance with a first embodiment of the invention. In FIG. 1, reference numeral 11 represents an engine; 16 represents a generator motor; 13 represents a planetary gear unit as a differential gear device including an output shaft 14, a sun gear S, a ring gear R and a carrier CR wherein the sun gear S, the ring gear R and the carrier CR are connected to the engine 11, the generator motor 16 and the output shaft 14,

respectively; B represents a brake as a fixing device for mechanically fixing rotation of the generator motor 16; 91 represents a correction value calculation processing means for calculating a correction value based on an estimated engine torque calculated through estimation and a generator motor torque; and 92 represents an engine torque correction processing means for correcting the estimated engine torque by the correction value.

Detail Description Paragraph (4):
[0027] FIG. 2 is a conceptual diagram of a hybrid vehicle in accordance with the first embodiment of the invention. In the drawing, reference numeral 11 represents the engine (E/G) disposed on a first axis; 12 represents an output shaft disposed on the first axis for outputting the rotation produced by driving the engine 11; 13 represents the planetary gear unit as a differential gear device disposed on the first axis for changing the speed of rotation inputted thereto via the output shaft 12; 14 represents the output shaft disposed on the first axis for outputting rotation after the speed of rotation has been changed by the planetary gear unit 13; 15 represents a first counter drive gear as an output gear fixed to the output shaft 14; and 16 represents the generator motor (G) as a first electric motor that is disposed on the first axis, and that is connected to the planetary gear unit 13 via a transfer shaft 17 disposed on the first axis as well, and is mechanically connected to the engine 11.

Detail Description Paragraph (13):
[0036] Thus, rotation produced by the engine 11 can be transferred to the first counter driven gear 31. Furthermore, rotation produced by the drive motor 25 can be transferred to the second counter driven gear 32. Therefore, by driving the engine 11 and the drive motor 25, the hybrid vehicle can be run.

Detail Description Paragraph (20):
[0041] The torque of the engine 11, that is, the engine torque TE, and the torque of the output shaft 14, that is, the output torque TO, and the torque of the generator motor 16, that is, the generator motor torque TG have the following relationship:

Detail Description Paragraph (22):
[0042] Thus, the engine torque TE, the output torque TO and the generator motor torque TG are affected by reaction forces from one another.

Detail Description Paragraph (23):
[0043] Next described will be a control apparatus of the hybrid vehicle constructed as described above.

Detail Description Paragraph (24):
[0044] FIG. 5 is a block diagram illustrating a control unit of the hybrid vehicle in accordance with the first embodiment of the invention.

Detail Description Paragraph (26):
[0046] Reference numeral 51 represents a vehicle control unit made up of a CPU, a recording device, etc. (which are not shown) for performing overall control of the hybrid vehicle; 44 represents a remaining battery charge detector device for detecting the remaining amount of battery charge SOC as a state of the battery 43; 52 represents an accelerator pedal; 53 represents a vehicle speed sensor for detecting the vehicle speed V; 55 represents an accelerator switch as an accelerator operation amount detecting device for detecting the amount of depression of the accelerator pedal 52, that is, the accelerator operation amount .alpha.; 61 represents a brake pedal; 62 represents a brake switch as a brake operation detecting device for detecting the amount of depression of the brake pedal 61; 38 represents a generator motor rotation speed sensor for detecting the generator motor rotation speed NG; 39 represents a drive motor rotation speed sensor for detecting the drive motor rotation speed NM; and 72 represents a battery voltage sensor for detecting the battery voltage VB as a state of the battery 43. The remaining battery charge detector device 44 and the battery voltage sensor 72 form a battery state detecting device.

Detail Description Paragraph (29):
[0049] Next described will be an operation of the hybrid vehicle constructed as

described above.

Detail Description Paragraph (30):
[0050] FIG. 6 is a main flowchart illustrating an operation of the hybrid vehicle in accordance with the first embodiment of the invention. FIG. 7 is a flowchart illustrating a sub-routine of an engine torque-corresponding amount calculating process in accordance with the first embodiment of the invention. FIG. 8 is a flowchart illustrating a sub-routine of a learning control process in accordance with the first embodiment of the invention. FIG. 9 is a time chart illustrating an operation of the hybrid vehicle in accordance with the first embodiment of the invention.

Detail Description Paragraph (31):
[0051] In the hybrid vehicle constructed as described above, power generation is performed by the generator motor 16 when the vehicle is run by driving the drive motor 25 (FIG. 2) and the engine 11. If the generator motor rotation speed NG is low, the power consumption becomes great and the power generation efficiency correspondingly reduces. Therefore, a design is made as follows. That is, if the generator motor rotation speed NG becomes equal to or less than 500 rpm and the brake region enters an engagement region (off), the rotor 21 is stopped by engaging (turning on) the brake B. After that, a generator motor rotation speed NG is calculated based on the output rotation speed NO calculated based on the vehicle speed V, and the engine revolution speed NE at an engine operation point where the power generation efficiency is high. If at a timing t1 the generator motor rotation speed NG becomes greater than 500 rpm and the brake region enters a release region (on), the brake B is released to allow the rotor 21 to rotate.

Detail Description Paragraph (33):
[0053] Therefore, an engine torque-corresponding amount calculation processing device as an estimated torque correction processing device (not shown) of the vehicle control unit 51 performs an engine torque-corresponding amount calculating process. That is, the device calculates the generator motor torque TG corresponding to an engine torque TEa that is actually transferred to the rotor 21 when the brake B is released, as an engine torque-corresponding amount TGa based on a learning control process.

Detail Description Paragraph (35):
[0055] Then, a torque control processing device (not shown) of the generator motor control unit 47 performs a torque control process. Upon receiving the target generator motor torque TG* from the vehicle control unit 51, the device calculates a generator motor torque instruction value STG* based on the target generator motor torque TG*. Subsequently, a current instruction value generation processing device (not shown) of the generator motor control unit 47 generates a current instruction value IG such that a deviation .DELTA.TG between the generator motor torque TG and the generator motor torque instruction value STG* becomes equal to "0", and sends the current instruction value IG to the generator motor 16 to drive the generator motor 16. Thus, the generator motor 16 is caused to produce the generator motor torque TG equal to the engine torque-corresponding amount TGa. Torque control is thus performed. Subsequently, a release processing device as a removal processing device (not shown) of the vehicle control unit 51 performs a releasing process to release the brake B.

Detail Description Paragraph (39):
[0059] Subsequently, a learned value calculation processing device of the learning control processing device performs a learned value calculating process. That is, the learned value calculation processing device reads the engine torque TE and the generator motor torque TG, and calculates the ratio of the generator motor torque TG to the engine torque TE, that is, the torque ratio .gamma.. In this embodiment, the learned value calculation processing device calculates the torque ratio .gamma. in every predetermined control cycle, and determines a mean value of torque ratios .gamma. calculated in a plurality of previous cycles as a learned value .gamma.a. The learned value .gamma.a forms a correction value for correcting an estimated engine torque TE.

Detail Description Paragraph (40):

[0060] After the learned value .gamma.a is calculated based on the engine torque TE and the generator motor torque TG as described above, the engine torque-corresponding amount calculation processing device corrects the engine torque TE by multiplying the estimated engine torque calculated by the engine torque calculation processing device, that is, the estimated engine torque TE, by the learned value .gamma.a, and thereby calculates the engine torque-corresponding amount TGa.

Detail Description Paragraph (50):
[0070] FIG. 10 is a main flowchart illustrating an operation of a hybrid vehicle in accordance with the second embodiment of the invention. FIG. 11 is a diagram illustrating a sub-routine of a learning control process in accordance with the second embodiment of the invention.

Detail Description Paragraph (52):
[0072] When the brake region is in the release region and the brake B is engaged, an engine torque-corresponding amount calculation processing device as an estimated torque calculation processing device (not shown) of the vehicle control unit 51 performs an engine torque-corresponding amount calculating process. That is, the device calculates the generator motor torque TG corresponding to an engine torque TEa that is actually transferred to the rotor 21 when the brake B is released, as an engine torque-corresponding amount TGa based on a learning control process.

Detail Description Paragraph (54):
[0074] Then, upon receiving the target generator motor torque TG* from the vehicle control unit 51, the generator motor control unit 47 calculates a generator motor torque instruction value STG* based on the target generator motor torque TG*. Subsequently, a current instruction value generation processing means (not shown) of the generator motor control unit 47 generates a current instruction value IG such that a deviation .DELTA.TG between the generator motor torque TG and the generator motor torque instruction value STG* becomes equal to "0", and sends the current instruction value IG to the generator motor 16 to drive the generator motor 16. Thus, the generator motor 16 is caused to produce the generator motor torque TG equal to the engine torque-corresponding amount TGa. Torque control is thus performed. Subsequently, a release processing device as a removal processing device (not shown) of the vehicle control unit 51 performs a releasing process to release the brake B.

Detail Description Paragraph (58):
[0078] Subsequently, the learned value calculation processing device calculates the torque difference .DELTA.T in every predetermined control cycle, and determines a mean value of the torque differences .DELTA.T calculated in a plurality of previous cycles, as a learned value .DELTA.Ta. The learned value .DELTA.Ta forms a correction value for correcting an estimated engine torque TE.

Detail Description Paragraph (59):
[0079] After the learned value .DELTA.Ta is calculated as described above, the engine torque-corresponding amount calculation processing device corrects the engine torque TE by adding the learned value .DELTA.Ta to the engine torque TE that has been calculated and estimated by the engine torque calculation processing device, and thereby calculates the engine torque-corresponding amount TGa.

CLAIMS:

1. A hybrid vehicle, comprising: an engine; a generator motor; an output shaft connected to a drive wheel; a differential gear device including at least three gear elements that are connected to the engine, the generator motor and the output shaft, respectively; fixing means for mechanically fixing a rotation of the generator motor; correction value calculation processing means for calculating a correction value based on an estimated engine torque calculated through estimation and a generator motor torque; and engine torque correction processing means for correcting the estimated engine torque by the correction value.

2. The hybrid vehicle according to claim 1, wherein the correction value calculation processing means calculates the correction value in a state where fixation of the

rotation by the fixing means has been removed.

3. The hybrid vehicle according to claim 2, wherein the correction value calculation processing means calculates the correction value based on a ratio of the generator motor torque to the estimated engine torque.

4. The hybrid vehicle according to claim 1, wherein the estimated engine torque is estimated based on an operation state of the engine.

5. The hybrid vehicle according to claim 1, wherein the correction value is calculated by averaging a plurality of variation values.

6. The hybrid vehicle according to claim 1, further comprising: engine torque-corresponding amount calculation processing means for calculating an engine torque-corresponding amount corresponding to a corrected estimated engine torque; torque control processing means for performing a torque control by causing the generator motor to produce the engine torque-corresponding amount; and removal processing means for removing fixation of the rotation by the fixing means while the engine torque-corresponding amount is being produced.

7. The hybrid vehicle according to claim 1, wherein a drive motor is connected between the output shaft and the drive wheel.

8. A hybrid vehicle, comprising: an engine; a generator motor; an output shaft connected to a drive wheel; a differential gear device including at least three gear elements that are connected to the engine, the generator motor and the output shaft, respectively; fixing means for mechanically fixing a rotation of the generator motor; correction value calculation processing means for calculating a correction value based on an angular acceleration of the generator motor; and engine torque correction processing means for correcting an estimated engine torque calculated through estimation, by the correction value.

9. The hybrid vehicle according to claim 8, wherein the correction value calculation processing means calculates the angular acceleration occurring when fixation of the rotation by the fixing means is removed.

10. The hybrid vehicle according claim 8, further comprising: engine torque-corresponding amount calculation processing means for calculating an engine torque-corresponding amount corresponding to a corrected estimated engine torque; torque control processing means for performing a torque control by causing the generator motor to produce the engine torque-corresponding amount; and removal processing means for removing fixation of the rotation by the fixing means while the engine torque-corresponding amount is being produced.

11. The hybrid vehicle according to claim 8, wherein a drive motor is connected between the output shaft and the drive wheel.

12. A control method of a hybrid vehicle including an engine, a generator motor, and fixing means for mechanically fixing a rotation of the generator motor, the control method comprising: calculating a correction value based on an estimated engine torque calculated through estimation and a generator motor torque; and correcting the estimated engine torque by the correction value.

13. The method of claim 12, wherein the correction value is calculated in a state where fixation of the rotation by the fixing means has been removed.

14. The method of claim 13, wherein the correction value is calculated based on a ratio of the generator motor torque to the estimated engine torque.

15. The method of claim 12, wherein the estimated engine torque is estimated based on an operation state of the engine.

17. The method of claim 12, further comprising: calculating an engine torque-corresponding amount corresponding to a corrected estimated engine torque; performing a torque control by causing the generator motor to produce the engine

torque-corresponding amount; and removing fixation of the rotation by the fixing means while the engine torque-corresponding amount is being produced.

18. A control method of a hybrid vehicle including an engine, a generator motor, and fixing means for mechanically fixing a rotation of the generator motor, the control method comprising: calculating a correction value based on an angular acceleration of the generator motor; and correcting an estimated engine torque calculated through estimation, by the correction value.

19. The method of claim 18, wherein the angular acceleration is calculated when fixation of the rotation by the fixing means is removed.

20. The method of claim 18, further comprising: calculating an engine torque-corresponding amount corresponding to a corrected estimated engine torque; performing a torque control by causing the generator motor to produce the engine torque-corresponding amount; and removing fixation of the rotation by the fixing means while the engine torque-corresponding amount is being produced.

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TITLE: A/C bus assembly for electronic traction vehicle

Abstract Paragraph (1):
An electronic traction vehicle comprising a principal power unit, a power storage unit mounted on a vehicle platform. A plurality of wheels are rotably mounted on the vehicle platform with an electric motor coupled to at least one wheel. A drive controller is coupled to the electric motor and a vehicle controller having an input and output terminal is coupled to the drive controller. A data bus network is coupled to the drive controller and the vehicle controller. An A/C bus assembly is coupled to the principal power unit, the power storage unit and the electric motor through the drive controller. Another embodiment of the electronic traction vehicle provides at least four electric motors and four drive controllers coupled to four wheels and the data bus network and A/C power bus assembly. Another embodiment of the electronic traction vehicle provides the components of the vehicle as moduled including an auxiliary module removably connected to the data bus network, and the A/C bus assembly.

Summary of Invention Paragraph (8):
[0005] The present invention provides an electronic traction vehicle comprising a principal power unit, a power storage unit mounted on a vehicle platform. A plurality of wheels are rotably mounted on the vehicle platform with an electric motor coupled to at least one wheel. A drive controller is coupled to the electric motor and a vehicle controller having an input and output terminal is coupled to the drive controller. A data bus network is coupled to the drive controller and the vehicle controller. An A/C bus assembly is coupled to the principal power unit, the power storage unit and the electric motor through the drive controller. Another embodiment of the electronic traction vehicle provides at least four electric motors and four drive controllers coupled to four wheels and the data bus network and A/C power bus assembly. Another embodiment of the electronic traction vehicle provides the components of the vehicle as moduled including an auxiliary module removably connected to the data bus network and the A/C bus assembly.

Summary of Invention Paragraph (9):
[0006] The present invention also provides an A/C bus assembly for interconnecting removable modules of an electronic traction vehicle. The modules include a principal power unit, a power storage unit an electric motor coupled to at least one wheel of the vehicle, a drive controller coupled to the electric motor, an electric dissipation unit, and a vehicle controller having a user interface all mounted on the vehicle. The A/C bus assembly comprises a first conductor having a first end and a second end and a second conductor having a first end and a second end wherein the first end of each conductor is coupled to the principal power unit and the second end of each conductor is connected to one of the modules. Another embodiment of the A/C bus assembly includes a third conductor having a first end and a second end with the first end coupled to the principal power unit and the second end coupled to one of the modules. A further embodiment of the A/C bus assembly includes a fourth conductor having a first end and a second end with the first end coupled to the principal power unit and the second end coupled to a ground terminal mounted on the vehicle, wherein the fourth conductor provides a neutral for interconnecting the modules. A junction is provided where modules can be connected to each of the conductors.

Summary of Invention Paragraph (10):

[0007] The present invention also provides a vehicle comprising a vehicle support structure having a plurality of wheels rotably supported by the vehicle structure wherein at least two of the wheels are steerable. A principal power unit is supported by the structure. At least one electric motor is coupled to at least one of the wheels of the vehicle. An electric A/C power bus including at least two phase conductors, wherein the phase conductors are coupled to the principal power unit and a power storage unit. A vehicle controller is coupled to the electric motor and the A/C power bus, a data bus coupled to the vehicle controller and a motor drive controller which communicates signals to the vehicle controller such that the speed and/or torque of the motor are controlled based upon the signals. The motor drive control unit is coupled to the electric motor. Another embodiment of the vehicle includes an energy dissipation unit coupled to the A/C power bus and the data bus and further embodiments of the vehicle includes a plurality of suspension assemblies, wherein each assembly independently suspends one of the wheels relative to the vehicle support structure.

Summary of Invention Paragraph (11):
[0008] The present invention also relates to a method of transferring data indicative of an electronic traction vehicle to potential customers over the Internet. The method includes obtaining information on the electronic traction vehicle, the electronic traction vehicle including a vehicle platform, a principal power unit mounted on the vehicle platform, a power storage unit mounted on the vehicle platform, a plurality of wheels rotably mounted on the vehicle platform, an electric motor coupled to at least one wheel, a drive controller coupled to the electric motor, a vehicle controller having an input and output terminal, the vehicle controller connected to the drive controller and a data bus network, and, an AC bus assembly to couple the principal power unit, the power storage unit and the electric motor through the drive controller. The method further includes entering the information on a terminal, the terminal operationally connected to an Internet server, the Internet server operationally connected to the Internet, and transmitting to the information from the terminal to the Internet through an Internet server.

Detail Description Paragraph (2):
[0013] An electronic traction vehicle 10 as illustrated in FIG. 1, comprises a vehicle platform or vehicle support structure 12 upon which various modules 84 are removably mounted. Such modules 84 include a principal power unit 16, a power storage unit 22, an electric motor 28 coupled to at least one wheel 14 of the vehicle 10, a drive controller 30 coupled to the electric motor 28, an energy dissipation unit 32 and a vehicle controller 34 having a user interface 36. Additional modules generally referred to as auxiliary modules 86, can be added to the vehicle 10 as circumstances and the situation warrants.

Claim 1

Detail Description Paragraph (11):
[0022] As mentioned above, the vehicle 10 can be provided with the principal power unit 16, the power storage unit 22, the electric motor 28, the drive controller 30, the vehicle controller 34, the suspension assembly 80 and other associated equipment as modules 84 that may be removably mounted on the vehicle platform. The modules 84 are also removably connected to the data bus network 76 and the A/C bus assembly 42. An auxiliary module 86 can be any type of equipment or tool required or associated with the function and operation of the vehicle 10. For example, the auxiliary module can be a pump, a saw, a drill, a light, etc. The auxiliary module 86 is removably connected to the data bus network 76 and the A/C bus assembly 42. A junction 88 is used to facilitate the connection of the modules to the data bus network 76 and the A/C power bus assembly 42 and are located at convenient locations throughout the vehicle 10. The junctions 88 can accommodate various types of connections such as quick connectors, nuts and bolts, solder terminals, or clip terminals or the like. The junction 88 can accommodate the data bus 72 or the phase conductor 44 or both.

Claim 3

CLAIMS:

3. The vehicle of claim 1, including another electric motor and drive controller coupled to another wheel and coupled to the data bus network and the AC bus assembly.

8. The vehicle of claim 1, wherein the principal power unit, the power storage unit, the electric motor, the drive controller, and the vehicle controller are modules removably mounted on the vehicle platform and removably connected to the data bus network and the AC bus assembly.

9. The vehicle of claim 8, including an auxiliary module removably connected to the data bus network and the AC bus assembly.

14. An AC bus assembly for interconnecting removable modules of an electronic traction vehicle, the modules including a principal power unit, a power storage unit, an electric motor coupled to at least one wheel of the vehicle, a drive controller coupled to the electric motor, an energy dissipation unit, and a vehicle controller having a user interface, the AC bus assembly comprising: a first conductor having a first end and a second end; and, a second conductor having a first end and a second end, wherein the first end of each conductor is coupled to the principle power unit and the second end of each conductor is connected to on of the modules.

23. An vehicle comprising: a vehicle support structure; a plurality of wheels rotatably supported by the vehicle structure, wherein at least two of the wheels are steerable; a principal power unit supported by the structure; at least one electric motor coupled to at least one of the wheels; an electric AC power bus including at least two phase conductors, wherein the phase conductors are coupled to the principal power unit; a power storage unit coupled to the AC power bus; a vehicle controller coupled to the electric motor and the AC power bus; a data bus coupled to the vehicle controller; and a motor drive controller unit coupled to the electric motor and to the data bus to communicate signals to the vehicle controller such that the speed and/or torque of the motor are controlled based upon the signals.

claim 7 37. The vehicle of claim 24, wherein the vehicle controller is configured to control the electric motor to brake the vehicle.

39. A method of transferring data indicative of an electronic traction vehicle to potential customers over the Internet comprising: obtaining information on the electronic traction vehicle, the electronic traction vehicle including a vehicle platform, a principal power unit mounted on the vehicle platform, a power storage unit mounted on the vehicle platform, a plurality of wheels rotatably mounted on the vehicle platform, an electric motor coupled to at least one wheel, a drive controller coupled to the electric motor, a vehicle controller having an input and an output terminal, the vehicle controller coupled to the drive controller and a data bus network, and an AC bus assembly to couple the principal power unit, the power storage unit, and the electric motor through the drive controller; entering the information on to a terminal, the terminal operationally connected to an Internet server, the Internet server operationally connected to the Internet; and transmitting to the information from the terminal to the Internet through an Internet server.